Bulletin University of Montana No. 35,
Biological Series No. 12.

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Eighth Annual Announcement

OF THE

University of Montana Biological Station

AT

FLATHEAD LAKE

BIGFORK, MONTANA

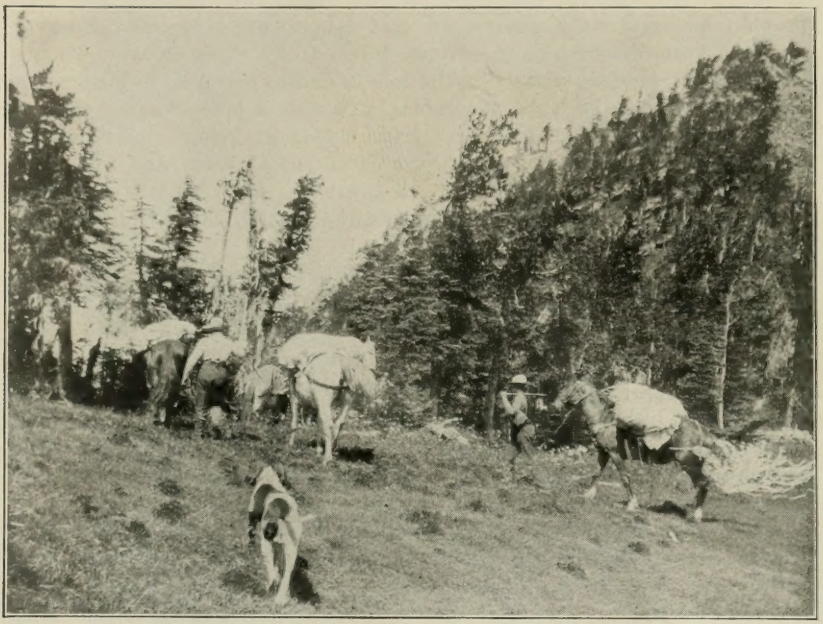

Fig. 118. Returning from the mountains.

EIGHTH SESSION, JULY 11 to AUGUST 16, 1906.

Oscar J. Craig, President, University of Montana, Lecturer.

Morton J. Elrod, Professor of Biology, University of Montana, General Zoology, Entomology, Plankton.

Thomas A. Bonser, Science, Spokane High School, Botany.

P. M. Silloway, Superintendent of Schools, Lewistown, Montana, Bird Study.

Gertrude P. Norton, East Helena, Nature Study, Artist.

C. H. Scherf, Science, Flathead County High School, Physiography.

Entered August 24, 1901, at Missoula, Montana, as second class matter, under an Act of Congress, July 16, 1894.

Purposes of the Station.

To serve as a field for research work in Botany, Zoology and Geology. To offer research work to candidates for a degree, such work being accepted by the University of Montana. To furnish a general course to college students, or to those preparing to teach. To make a place for high school students, where they may be permitted to work under the most favorable opportunities. To afford opportunity to teachers to collect material for class use and for their own laboratories. To provide lectures, field excursions, and laboratory exercises so as to give the best insight into the proper method of nature study. To see some of the grandest scenery in the world, and to receive the inspiration felt by those who see grand panoramas. To offer a place where healthful recreation may be had, free from care, under inspiring conditions, accompanied with an environment stimulating observation and investigation. To offer a place where kindred spirits in the state may meet and exchange ideas and by this friendly meeting receive added stimulus and enthusiasm for work.

COURSES OF STUDY.

The following scheme will give those who wish to attend an idea of the kind and character of the work that may be done.

Zoology:—

(a) General Zoology, principally field work, instructions in methods of study and observation, illustrating the influence of environment. An observational study, full of suggestion, very helpful to those who have had no such opportunity for study. Material will be collected and worked up in the laboratory.

(b) Field and laboratory course in Entomology. Instruction in collecting, preserving and labelling insects. Dissection and study of type specimens. A study of injurious insects.

(c) Ichthyology. Special course devoted particularly to the lake and river fishes and their food supply. The course will include plankton study.

(d) Ornithology. A study of birds, with methods of collecting, making and preserving skins; habits and lives of birds of the rich avian region adjacent.

(e) Plankton. A study of the microscopic life of Flathead Lake.

Botany:—

(a) Laboratory and Field Course. Study of type forms of Algae, Fungi, Lichens, Bryophytes, Pteridophytes, and Spermatophytes. Especial attention will be given to the Conifers of the vicinity. There will also be collecting trips in the field, where the various type forms may be found. In the laboratory, attention will be given to the classification of the more common species, to the study of Plant Morphology, to the

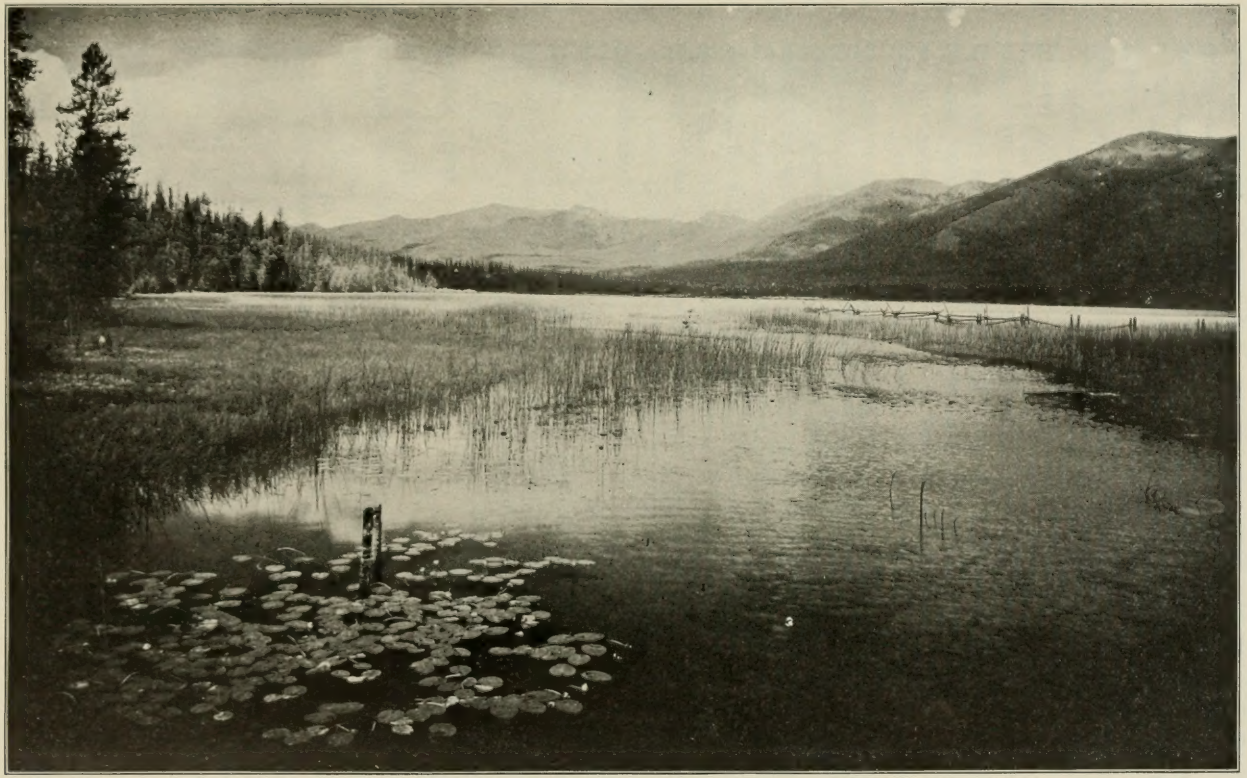

Fig. 119. General view of Rost Lake from the outlet. The Swan Range of the Kootenais is in the distance. Around the lake are tree or forest plant association. Bordering these are meadow societies. In the water are hydrophytic forms.

methods of preparation of Herbarium specimens, and to the methods of preservation in liquid for immediate or permanent use.

(b) Ecology. A general course including local ecological problems, and local plant geography. This region offers quite a diversity in plant societies.

Photography:—

The region offers rare opportunities for this branch of study. The work will include a study of lenses, plates and developers. The use of the ray filter will be explained, and the many errors which may fall to the lot of the beginner will be pointed out. The course will include the selection of subject, development, printing on one or two kinds of paper, and transparencies.

Students in photography must supply their own plates or films and paper. There is a dark room at the laboratory and the scenery in the vicinity gives ample scope for a series of negatives either in landscape or of scientific subjects.

Nature Study:—

A course of study and practical work will be outlined which will afford both a fund of information on which to draw during school work and at the same time secure a collection of material to be used in illustration. The scope of the work will include zoology, botany, geology, and physiography of the region.

Physiography:—

Largely field work. The region furnishes examples of all of the important types of erosion, weathering, ice work, running water, shore work, etc. Sedimentation and diastrophic work are also well illustrated. An attempt will be made to trace the history of a stream, the effects of glaciation on a region, the method of mountain formation, results of sedimentation, and coast forms. Some reading will be done in the field. A copy of Davis, Dryer, or Tarr will be found useful. Geike's Earth Sculpture or any of Russel's books will help. Beside this there will be offered a series of illustrated lectures covering the important topics in physiography. The slides will represent types selected from all parts of the world. This course should be of particular interest to those who teach physical geography, either in the high school or in the grades, for to explain these important things to a class one must have **seen** them. A summer in the Bigfork region should make any teacher alive in this subject.

Special Work:—

Students and investigators will be encouraged to pursue some special study, taking such problems as may be pursued with profit during the session.

It must be understood that while the daily lectures are given to all, yet each individual works alone, pursuing such study as may be best fitted to his ability and requirements. The beginner has the same opportunity as the advanced student. Realizing that study of biological subjects is not extensive in the state, preparation is made for those who have not pursued such study.

LOCATION.

The University of Montana Biological Station was opened in 1899. For the past seven summers the station has been occupied from June until September or October. During this time some fifteen states have been represented. The Station has become well known to many American naturalists, and all are enthusiastic in their praise of opportunities afforded in the vicinity of Montana's large inland lake.

For scenery the vicinity cannot be surpassed. Few places offer more varied points of interest. The roaring rapids of Swan river are at the door of the building. Flathead lake, covering more than 300 square miles of territory, with its beautiful islands and precipitous shores, has great attractions. The Mission range, beginning on the burnt hills by the

Fig. 120. A bit of Flathead lake, near the Laboratory. Photo by M. J. E.

laboratory, and rising higher and higher as they extend southward, culminate in snow capped peaks 10,000 feet in height. A few miles to the east is the Swan range, its high summits constantly in view. These two mountain ranges afford some of the most beautiful panoramas to be seen in the Rocky Mountains, and rival the Alps in magnificent scenery. Farther to the east, reached in a short time by pack train, the main chain of the Rocky Mountains breaks the horizon with lofty peaks and precipitous summits. Untrod summits invite the courageous naturalist who seeks the unknown animal and vegetable life. West of Flathead lake are the almost unexplored Cabinets. Within a few miles are many lakes—Swan, Echo, Rost, and others—while many ponds and swamps are in the immediate vicinity. The waters of Swan and Flathead rivers supply Flathead lake, the former at the laboratory door, the latter but two miles distant. East and south of the laboratory the forests extend

unbroken for a hundred miles, with here and there a settler's cabin. Such a combination of lakes, rivers, mountains, forests, at elevations from 3,000 to 10,000 feet, one will find in few places in America.

The present site of the Station was chosen because of the advantages mentioned above. The seaside will always have its attractions and its devotees. But there are those who love the mountains, who delight in craggy heights, and who find abundance of material for study because it is new and the field unexplored. There are many who cannot take long trips to the sea shore, others who wish to spend a summer on the inland lakes, in the primeval forest, and among the snow-clad hills. Then there is the home field. Montana needs a wider dissemination of knowledge of outdoor study. Here may be had healthful recreation, beautiful surroundings, congenial associates, and rare opportunities for observation and study.

The climate is delightful. Rarely does it rain in July and August. In the shade it is always pleasant. Long trips may be planned without danger from the elements. One may sleep out without fear. In a day from the laboratory one may reach huge snow banks in middle August. There is an abundance of sunshine, no fogs nor dreary days, and few days of excessive heat.

Further information in regard to the station and its work may be found in the bulletins mentioned later in this circular, and in the following publications: Journal of the New York Botanical Garden, January, 1902, pp. 8-13; Journal of Applied Microscopy, Vol. IV, No. 5, pp. 1269-1278; Science, N. S., Vol. XX, pp. 205-212; Rocky Mountain Magazine, Vol. IV, No. 4, 1901, pp. 781-787.

EQUIPMENT.

The building is a convenient out-door laboratory, with tables for a dozen students. The station work has entirely outgrown the building. Many of the lectures are given out of doors in the yard. The fine summer weather permits of much laboratory work out of doors. There is a dark room for photography. There are three boats which are the property of the station. Other boats may be had at any time. Microscopes, glassware, books and utensils will be supplied from the University. Botanical collecting and drying material will be supplied.

Students in Ornithology must supply their own guns or field glasses. Students in Photography will furnish their own cameras and plates. The necessary chemicals for development will be supplied free. Students who live in tents will supply their own tents and bedding.

UNIVERSITY CREDITS.

Students from the University may pursue study at the Station and receive credit for such work as may be equivalent to University courses. Students taking elementary study may receive preparatory credits.

METHODS OF INSTRUCTION.

The work will consist very largely of field collecting and observation, study of relation to environment, supplemented by laboratory dissections and microscopic examination. The general courses will enable teachers to familiarize themselves with methods of field work, and

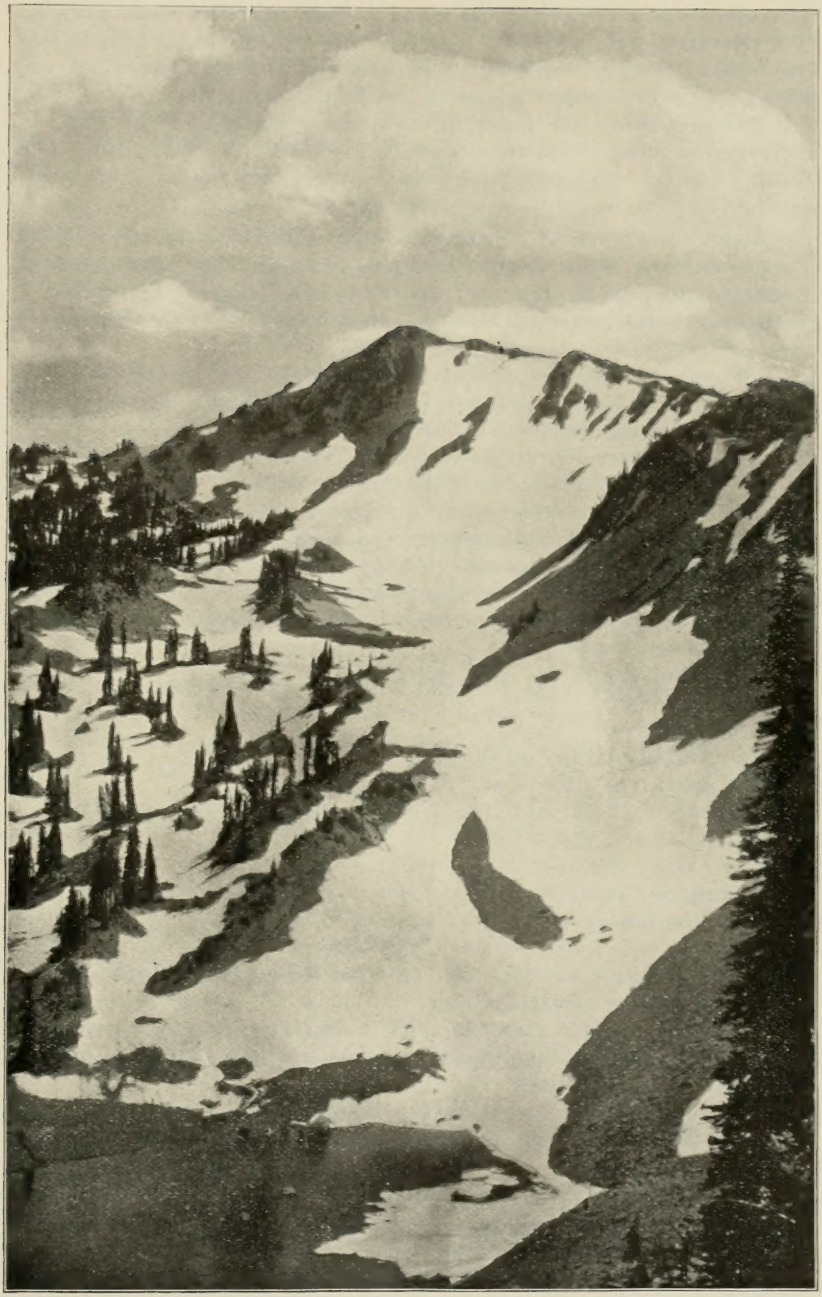

Fig. 121. MacDougal Peak, Swan Range, from the ridge, showing snow field with ice. Photo by M. J. E., August, 1902. The view is south. Altitude of summit, 7725. This summit is visited annually by the station people.

give a store of information from which to draw in nature study subjects. The general courses also give opportunity to students and others to pursue lines of study with better facilities for out-door work with fresh material, than is generally to be had in regular university work.

The expeditions are primarily to give opportunity for the study of animals and plants in their natural environment. By this means more lasting interest is aroused, and more accurate information is obtained.

LECTURES.

Almost every day a lecture on some biological topic will be given at the laboratory. Some of the lectures given in 1902 have been incorporated in Bulletin University of Montana, Biological Series No. 5. Thirteen lectures, covering 90 pages, with 5 plates and 27 figures, are included.

The following lectures will be given during the coming session:

The Debt of Science to Lewis and Clark, with Stereopticon.
The Forests of Flathead Valley.
Montana's Agricultural Water Supply, with Stereopticon.
Studies in Alpine Life, with Stereopticon.
The Mosquito Problem.
The Place of Field Work in Scientific Study.
The Mission Mountains, with Stereopticon.
Evolution of Plant Forms, with Stereopticon.
Evolution of Plant Reproduction, with Stereopticon.
Elementary Forestry.
Plant Societies of the Northwest.
The Coniferae.
Seed Dispersal.
The Ancient History of America.
The History of a River and Some Waterfalls.
The effects of Glaciation on a Region, and Some Glacial Lakes.
Mountains and Volcanoes.
Some Coast Forms.
Mountaineering.
The Deep Sea.

EXCURSIONS.

The following excursions will be taken during the session of 1906, unless the weather is unfavorable:

1. A trip to Swan Lake, through the forests, with stop over night at the lake. This is a beautiful lake in the mountains, of great interest biologically and geologically.

2. A trip to Rost Lake, at the base of the Kootenay Mountains. This is a lake almost filled up, a fine collecting field. It is an admirable location for camps.

3. An ascent of MacDougal Peak via an Indian trail, to an altitude of 7,725 feet. This will afford opportunity for alpine collecting, and will present some of the most sublime scenery in the world.

4. A trip around Flathead Lake, making study of its banks, bays, and swamps.

These trips will be under the personal supervision of the Director of the Station. Those taking the trips must bear a proportionate share of the expense necessary. Such trips will prove of great value and interest biologically aside from the pleasures they bring. These trips are not for mere pleasure, but for scientific study. Daily conferences are held to report on observations and to make suggestions.

HOW TO REACH THE STATION.

Students via Northern Pacific will get off at Ravalli. Stage tri-weekly runs to Flathead Lake (35 miles), connecting with steamer Klondyke, which runs across the lake. Stage fare, one way, $3.00, round trip, $5.00, trunks extra. Boat fare across the lake, one way, $3.00, round trip, $5.00. Stage leaves Ravalli on Mondays, Wednesdays and Fridays, connecting with the steamer, returning the same day. A daily stage, carrying mail and passengers, runs from Ravalli to Polson via Mission and Ronan. Passengers may thus travel to Polson daily. Both stages start from Ravalli, reaching Polson by different routes. They are under different managements.

Students via Great Northern will get off at Kalispell, connecting by stage with the steamer Klondyke at Demersville, a short distance from Kalispell. The steamer will land passengers at Bigfork.

The trip either route is full of interest. There are ample hotel accommodations, and the ride is comfortable and easy, with beautiful scenery always in view.

DATE OF OPENING.

The laboratory work of the Station will begin Wednesday, July 11, and continue five weeks, or until Thursday, August 16. For a week or more before the Station opens some one of the staff will be at or near the Station, and will aid any who may choose to work during such time. The laboratory is at the disposal of students from June 15 to September 1, or even later, if any wish to use it.

BOARD AND ROOM.

Most of those at the Station, including the staff, live in tents. Day board may be had at $4.50 to $5.00 per week. Many prefer to do their own cooking. The stores supply all the necessaries of life, while the region affords an abundance of fruit and vegetables. Daily mail gives easy communication with the outside world. There is also telephone connection. Those who do not wish to live in tents will find suitable accommodations at $6.00 per week for two or $7.00 for one in a room.

RECREATION.

Change is rest. To take a day off and go fishing often gives new lease of life. The tingle of the nerves when the gamey fish tugs at the line is to forget care and to be thoroughly alive. Many will wish to combine an outing with study. In fact, one of the attractions of the place is its natural advantages so as to induce out-door exercise and study. The lake and rivers make rowing a good pastime. The photographer has a field of wondrous richness and varied interest. A fine sand beach makes bathing a delight, and it is indulged in. Unless the lake is stirred by

winds the water is warm. The hills and forests afford quiet retreats for study or strolls. The hills and roads give glimpses of scenery of rare beauty. At the proper season hunting is good. Deer have been seen annually a few rods from the laboratory. Grouse and pheasants abound in the hills. In season duck shooting is fine. A day's tramp will take one to the home of the Rocky Mountain goat. In a day one may penetrate a pathless forest or stand on craggy heights, where the view presents the jagged Rockies, the backbone of the continent.

PUBLICATIONS.

Articles from persons who have attended the Station or taken part in its work have appeared from time to time in such magazines and periodicals as The Journal of Applied Microscopy, The Nautilus, Science, The Condor, The Botanical Gazette, Journal of the New York Botanical Garden, etc. The bulletins issued by the University as a result of the work are: No. 1, "Summer Birds of Flathead Lake," P. M. Silloway, 84 pp., 16 plates; No. 2, Announcement of the Fourth Annual Session; No. 3, "A Biological Reconnaissance in the Vicinity of Flathead Lake," M. J. Elrod, 94 pp., 29 plates; No. 4, Announcement of the Fifth Annual Session; No. 5, "Lectures Delivered at the Station," 78 pp., 6 plates, 28 figures; No. 6, "Additional Notes to Summer Birds of Flathead Lake," P. M. Silloway, 32 pp., 5 plates; No. 7, "Lichens and Mosses of Montana," W. P. Harris and Carolyn W. Harris, 24 pp., 9 plates; No. 8, Sixth Annual Announcement; No. 9, Seventh Annual Announcement; No. 10, "The Butterflies of Montana," by Morton J. Elrod, assisted by Frances Inez Maley, B. A., pp. 1-174, with one colored and thirteen black and white plates and twenty-five figures; No. 11, A List of the Fishes of Montana, by James A. Henshall, 14 pp.

LIFE AT THE STATION.

There is a freedom of living which makes life pleasant for those attending. Out-door clothing is worn by all. A canvas suit with plenty of pockets is suitable for men, with a business suit for occasions. For mountain trips a suit of woolen underwear is desirable, and a sweater will come handy. For tramps in the woods, climbing mountains, or walking the rocky beach, a pair of heavy soled and hob-nailed shoes are a necessity. As most of the Station work is out of doors and of the rough and ready nature, good clothes are an encumbrance. The freedom from conventional dress makes Station life more helpful and desirable. A good bathing suit will be found serviceable.

BAGGAGE.

Avoid trunks. Pack outfits in rolls, covered by canvas, fastened by large and strong straps or ropes. Hand baggage of any kind is not troublesome. Heavy weight of books is unnecessary. For those who live in tents, as most persons prefer to do, a tent is necessary. This will make a small roll, and for ordinary miner's or wall tents poles are not necessary. They may be cut after arrival.

Those who sleep in tents must remember the nights are always cool. A cheap tick, ready to be filled, and two comforts or heavy blankets over, with whatever is desired under the individual, are necessary. These can be purchased after arrival, if this is desired, and at reasonable rate. In place of the preceding a sleeping bag is a luxury.

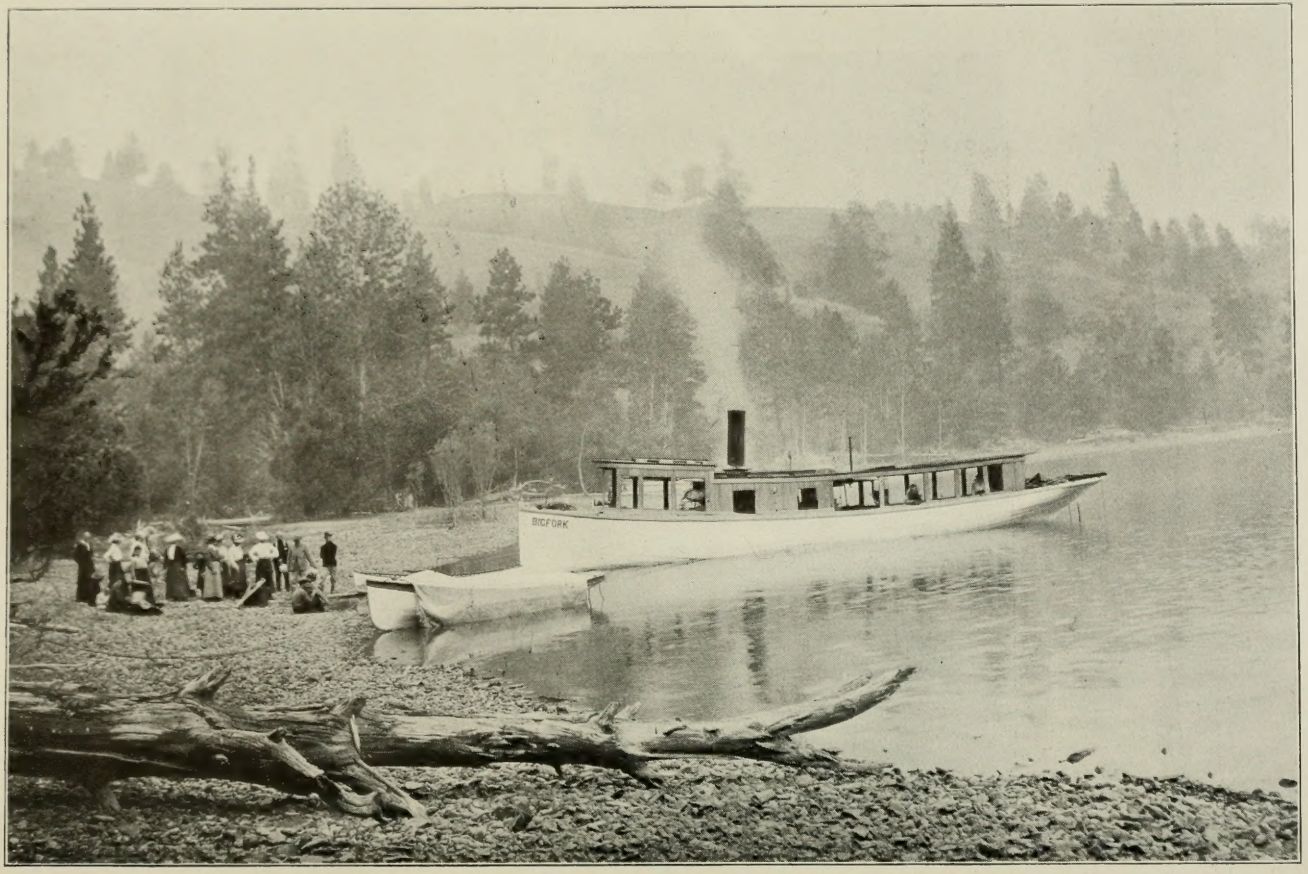

Fig. 122. An expedition of biological students, at work on Flathead Lake. Photo by M. J. E.

Reduce baggage to a minimum in weight. Heavy weight of books is not advisable, but reading matter for leisure moments should be brought.

Eastern students can visit the Station at very low expense. The Great Northern and Northern Pacific railroads have low rates to the west every summer. Stopover privileges can be secured giving plenty of time to spend at the Station. It is thus possible to spend a summer in the mountains, gather plenty of working material from a new field, at low expense. Such an opportunity to visit mountainous regions is offered at few places.

For any further information address,

MORTON J. ELROD, Director,
Missoula, Montana.

For information concerning the University, its departments, courses of study, etc., address,

OSCAR J. CRAIG, President,
Missoula, Montana.

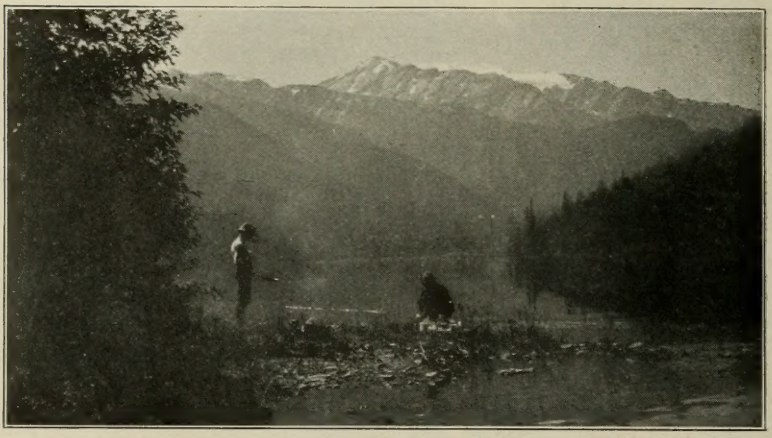

Fig. 123. Camp at Stanton Lake.